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Environmental Assessment SCA Chemical Services Company Hazardous Waste Management Facility Chicago/Lake Calumet

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SECTION IV

DESCRIPTION OF THE PROPOSED PROJECT AREA

A. Description of the Physical Environment

1. Geology and Soils

The facility site was formerly covered by the waters of Lake Calumet. As such, the uppermost natural deposits at the site are lacustrine in nature. Underlying the man-made deposits of uncompacted earth materials is an organic marsh layer, formed after lake levels receded during the Pleistocene Age. Underlying the organic layer is the Equality Formation, the former lake bottom, a layer of lacustrine sand less than 20 feet thick.

Glacial till, the Wadsworth member of the Wedron Formation, bottom sediment of the glacial Lake Chicago (which was present earlier in the Pleistocene), is the next geologic formation encountered. The till is a gray, calcareous, clayey and silty clay till comparatively low in pebbles, cobbles, and boulders. Occasional thin silt lenses are present in the formation.

Soil borings at the facility site were taken October 9, 1980 by Raymond International, Inc. (see Appendix B). The fill at the site was found to be a mixture of slag, silt, clay, stones, and rubble seven to eighteen feet in

thickness. The pH was high, ranging from 7.5 to 11.8 in some areas, due most likely to the nature of the wastes deposited. Medium dense to dense silt mixed with organics was found underlying the fill. Below this silt layer, stiff to hard gray silty clay, with isolated layers of silt, was found. The borings were terminated in this clay layer, 30 to 60 feet below the ground surface. The lacustrine sand layer common in the area usually encountered at a depth of five to fifteen feet was not found in any of the soil borings taken at the site.

Below the glacial till, dolomite initially deposited as limestone on the bottom of a shallow sea is encountered. This dolomite is found at a depth ranging from approximately 70 to 110 feet. This system, deposited during the Silurian period, ranges from pure dolomite to dolomite that is argillaceous, silty, and cherty. The maximum thickness of the dolomite in the Lake Calumet area is 500 feet.

An Ordovician system 700 to 1,000 feet in thickness, comprised of three series, underlies the Silurian dolomite. The uppermost series, the Maquoketa Group, is an impermeable layer of mainly shale and limestone. The middle series, the Champlain series, is largely lime-

stone and dolomite with a base of sandstone. The lower series, the Canadian series, is predominately dolomite but contains some sandstone. This system is also a marine deposit.

The next system encountered, also a marine deposit, is the Cambrian system. Sandy dolomite, sandstone, and siltstone make up the upper portion of the system. The lower portion consists mainly of sandstone.

Underlying all of these lake and sea deposits is a Pre-Cambrian igneous granite formation. This granite should be encountered at a depth of approximately 4,000 to 5,000 feet at the facility site.

2. Topography

The land area around the facility site is low, marshy, and flat. Uncompacted fill has made the site approximately four feet above the level of Lake Calumet. Slips have been constructed from the lake into the site. The elevation of the area is approximately 585 feet above sea level.

3. Climate

The climate of the Chicago area is continental, modified somewhat by the influence of Lake Michigan. There are strong changes from season to season. During the summer high temperature and high humidity may make conditions

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oppressive. In the winter, very low temperature and considerable cloudiness occur. Approximately half of the precipitation in the winter falls as snow. This amounts to an average of 39 inches of snow each year. Total precipitation is approximately 33 inches per year. Evaporation rates are approximately 32 inches per year.

The average summer temperature in the Chicago area is 72°F; the average winter temperature is 29°F. Temperatures at the facility site will be moderated somewhat by the influence of Lake Calumet and Lake Michigan.

Local climatological data from 1978 for the Midway Airport, the NOAA station closest to the facility site, is given in Appendix C of this report.

4. Air Quality

Five air sampling stations are located near the facility site (refer to Figure IV.1.):

Anthony Elementary School	9800 S. Torrence Ave.
Addams Elementary School	10810 S. Avenue H
Washington High School	3500 E. 117th Street
Carver High School	803 E. 133rd Street
Rosemont Pumping Station	351 West 104th Street

Nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and suspended particulates are monitored at the first four

stations. Summaries of annual data from these stations are given in Table IV.1. Ozone is measured at the fifth station, the Rosemont Pumping Station. In 1978 the one-hour ozone standard was exceeded 233 times.

The Lake Calumet area has been designated by the U.S. EPA as being an attainment area for SO_2. Ambient levels of SO_2 are less than both the primary and secondary National Ambient Air Quality Standards (NAAQS) set for protection of health and welfare. The area has been designated as a non-attainment area, however, for NO_2, total suspended particulates, ozone, hydrocarbons, and carbon monoxide.

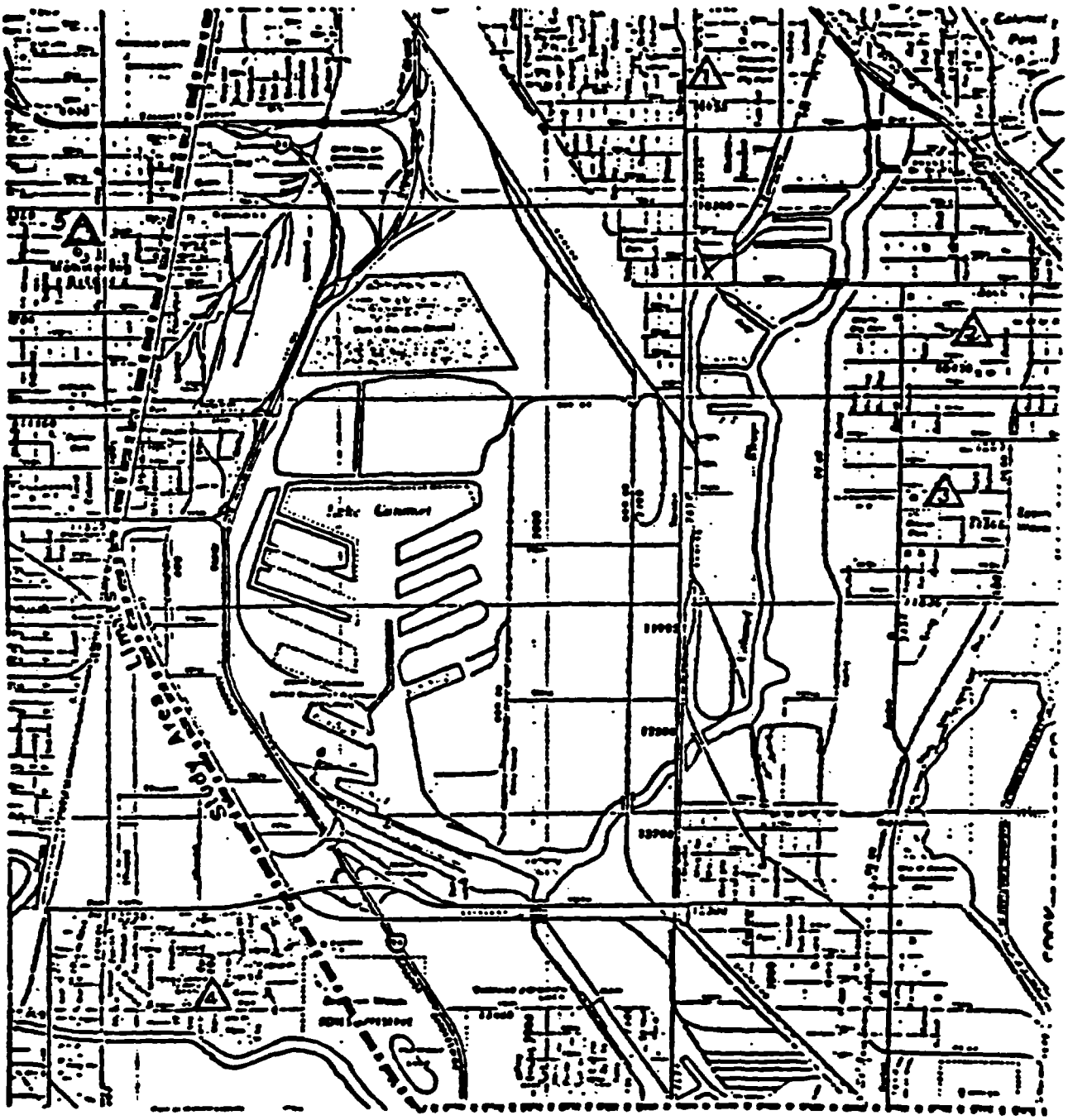
In addition, the Lake Calumet area has been designated as a Class III area by the State of Illinois under the "Prevention of Significant Deterioration" criteria. Class III areas are highly developed urban areas. Deterioration of air quality is allowed up to the NAAQS (see Table IV.2.).

Each source, however, can increase concentrations of particulate matter and sulfur dioxide only a specified amount:

	mg/m^3
Total Suspended Particulates	
Annual geometric mean	37
24-hr. maximum	75

FIGURE IV.1.

AIR SAMPLING LOCATIONS NEAR FACILITY



1. Anthony Elementary School, 9800 S. Torrence Avenue
2. Addams Elementary School, 10810 S. Avenue H.
3. Washington High School, 3500 E. 114th Street.
4. Carver High School, 803 E. 133rd Street.
5. Rosemont Pumping Station, 351 West 104th Street.

Source: EIS for Lake Calumet Harbor Area Development, City of Chicago, August, 1979

TABLE IV.1.

NITROGEN DIOXIDE READINGS
(annual arithmetic mean)

	YEAR				
SITE	1974	1975	1976	1977	1978
Anthony	0.030 ppm	0.024 ppm	0.033 ppm	0.038 ppm	0.039 ppm
Addams	0.032 ppm	0.031 ppm	0.034 ppm	0.039 ppm	0.036 ppm
Washington	0.031 ppm	0.032 ppm	0.034 ppm	0.036 ppm	0.040 ppm
Carver	0.030 ppm	0.031 ppm	0.031 ppm	0.036 ppm	0.041 ppm

SULFUR DIOXIDE READINGS
(annual arithmetic mean)

	YEAR				
SITE	1974	1975	1976	1977	1978
Anthony	0.003 ppm	0.006 ppm	0.009 ppm	0.009 ppm	0.009 ppm
Addams	0.021 ppm	0.016 ppm	0.015 ppm	0.013 ppm	0.009 ppm
Washington	0.022 ppm	0.013 ppm	0.011 ppm	0.010 ppm	0.007 ppm
Carver	0.013 ppm	0.008 ppm	0.010 ppm	0.008 ppm	0.008 ppm

SUSPENDING PARTICULATE READINGS
(annual geometric mean)

	YEAR				
SITE	1974	1975	1976	1977	1978
Anthony	95 $\mu g/m^3$	86 $\mu g/m^3$	90 $\mu g/m^3$	87 $\mu g/m^3$	88 $\mu g/m^3$
Addams	123 $\mu g/m^3$	105 $\mu g/m^3$	131 $\mu g/m^3$	119 $\mu g/m^3$	108 $\mu g/m^3$
Washington	153 $\mu g/m^3$	148 $\mu g/m^3$	175 $\mu g/m^3$	172 $\mu g/m^3$	121 $\mu g/m^3$
Carver	72 $\mu g/m^3$	73 $\mu g/m^3$	90 $\mu g/m^3$	80 $\mu g/m^3$	85 $\mu g/m^3$

TABLE IV.2.

U.S. EPA
NATIONAL AMBIENT AIR QUALITY STANDARDS

Pollutant	Primary Standards			Secondary Standards		
	$\mu g/m^3$	ppm	Averaging Time	$\mu g/m^3$	ppm	Averaging Time
Sulfur Dioxide	80 365	0.03 0.14	aam 24 hr.	1300	0.50	3 hr.
Total Suspended Particulates	75 260		agm 24 hr.	60 150		agm 24 hr.
Carbon Monoxide	10 40	9 35	8 hr. 1 hr.	10 40	9 35	8 hr. 1 hr.
Photochemical Oxidants	240	0.12	1 hr.	240	0.12	1 hr.
Non-methane Hydrocarbons	160	0.24	1,2	160	0.24	3 hr. 1,2
Nitrogen Dioxide	100	0.05	aam	100	0.05	aam
Airborne Lead	1.5				N/A	

1 - Not to exceed more than once a year
2 - 6 a.m. to 9 a.m.
aam - annual arithmetic mean
agm - annual geometric mean
μg - microgram
ppm - parts per million
m^3 - cubic meter

	mg/m^3
Sulfur dioxide	
Annual arithmetic mean	40
24-hr. maximum	182
3-hr. maximum	700

5. Hydrology

Two distinct aquifer systems exist in the Lake Calumet area. The upper groundwater is contained in the fill, in the organic marsh deposits, and in the lacustrine sand deposits. This water intersects the surface in the marshy areas and ponds and is in hydraulic balance with the waters of Lake Calumet, which are in turn in hydraulic balance with the waters of Lake Michigan. Little use is made of these shallow aquifers in the Lake Calumet region.

The shallow aquifers are separated from the deeper aquifers by the impermeable clays of the glacial till layer. Groundwater does exist in the Silurian dolomite, but because of the structure's tightness, yields are quite low. Only the Ironton-Galesville Sandstone, at a depth of approximately 1,500 feet, is capable of supplying substantive yields. This water, however, has a high mineral content which makes it acceptable for use by only a few industries. Deeper aquifers are just too deep to economically develop.

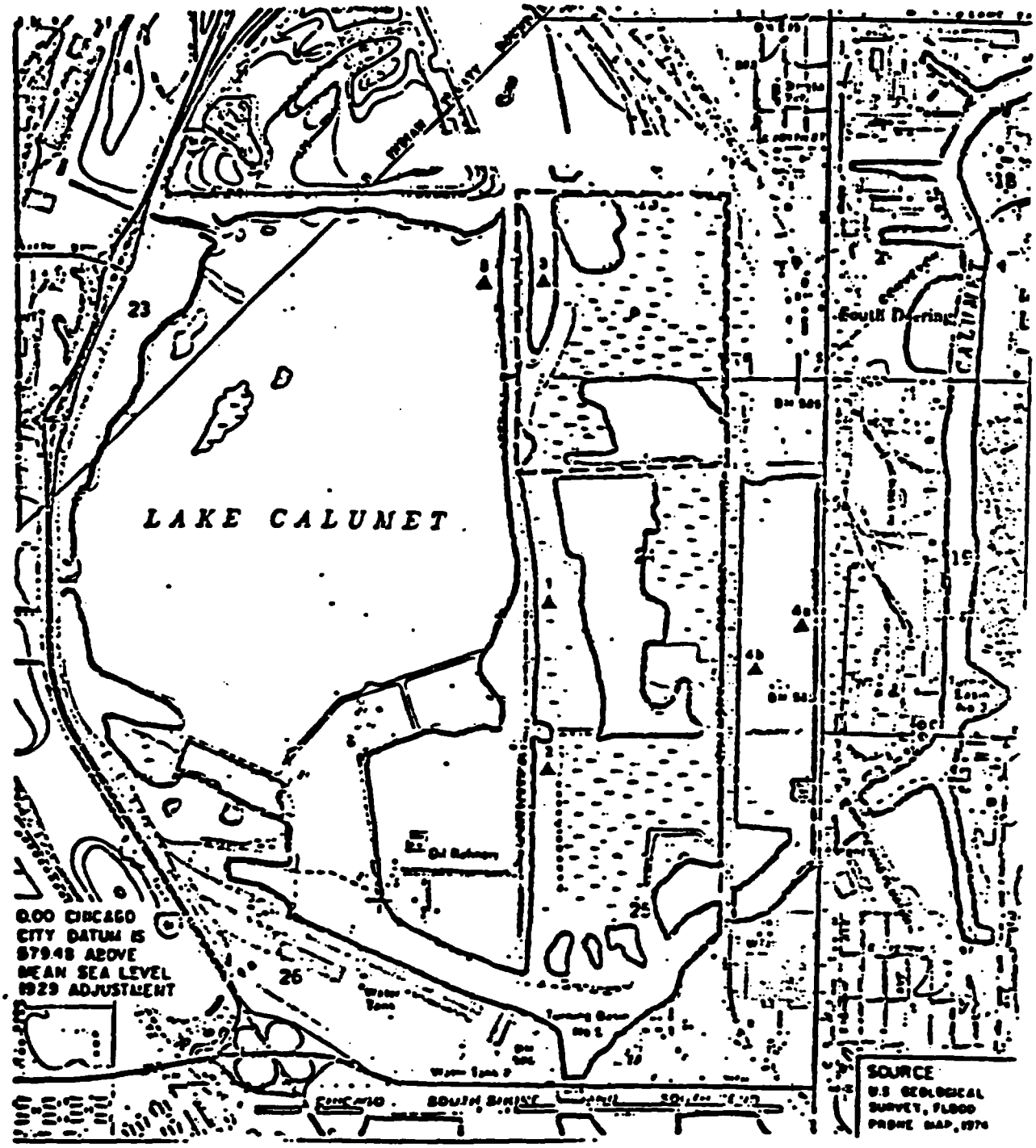
The waters of Lake Calumet and the Calumet River have been designated as Secondary Contact and Indigenous Aquatic Life Waters. The designation is for waters that humans do not have direct contact with, i.e., via recreational activities, and waters not used as a public supply source. Data from a monitoring station on the Calumet River at the 130th Street Bridge showed "good or balanced" levels of fecal coliform, dissolved oxygen, dissolved solids, and ammonia nitrogen (1975 data), but high levels of lead. Also, low levels of dissolved oxygen (June 1976) have been recorded.

The City of Chicago collected additional data on October 3, 1978. Water and sediment samples were taken. Monitoring locations are shown in Figure IV.2. Data is given in Tables IV.3. and IV.4. Site #1, the Paxton Site, is very close to the facility site. In comparison with the other sampling points in the area, site #1 showed the strongest odor and the highest levels of ammonia nitrogen, iron, and phenols in the water sample and the highest levels of COD, lead, ammonia nitrogen, cadmium, and mercury in the sediment sample.

Currently, bottled water is brought into the facility for drinking water; water from Lake Calumet is used for other purposes. The public water supply system, which the facility may have access to in the near future, originates

FIGURE IV.2.

WATER AND SEDIMENT SAMPLING SITES



1. Paxton Site
2. Corps of Engineers Site
3. 110th Street and Stony Island Site
4a. 122nd Street and Torrence Avenue Site
4b. 122nd Street and Torrence Avenue Site
5. Lake Calumet

Source: EIS for Lake Calumet Harbor Area Development, City of Chicago, August, 1979.

TABLE IV.3.

WATER QUALITY DATA - LAKE CALUMET WATER
Date Collected: Oct. 3, 1978

		SITE					
		1	2	3	4A	4B	5
Odor	TON	10DS	5DM	5DM	8DS	4DM	4DM
Turbidity	NTU	50	15	4.8	40	2.8	25
Ammonia Nitrogen	mg/l	10.4	0.03	0.60	0.50	0.66	0.11
Phosphorus	mg/l	0.11	0.40	0.09	0.23	0.13	0.04
Arsenic	µg/l	<1	<1	<1	<1	<1	<1
Cadmium	µg/l	<1	<1	<1	<1	<1	<1
Chromium	µg/l	<1	<1	2	<1	<1	<1
Cyanide	mg/l	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Iron	mg/l	2.00	0.90	0.45	1.20	0.50	0.65
Lead	µg/l	<1	15	<1	3	5	14
Mercury	µg/l	0.13	<0.1	<0.1	0.50	0.35	<0.1
Nickel	µg/l	<1	<1	<1	3	2	2
pH/^{o}C		8.3/26	8.4/26	8.3/25	8.8/25	8.1/26	8.4/26
Phenols	µg/l	3	<1	<1	<1	<1	<1
Selenium		-	-	-	-	-	-
Silver	µg/l	<1	<1	<1	<1	<1	<1
Zinc	µg/l	<1	40	5	5	20	20
Total Dissolved Solids	mg/l	966	1007	1268	1982	591	226

Source: City of Chicago, Department of Water & Sewers,
Bureau of Water Operations
Water Purification Division
Water Purification Laboratory
Chemistry Unit

TABLE IV.4.

WATER QUALITY DATA - LAKE CALUMET SEDIMENT
Date Collected: Oct. 3, 1978

		SITE					
		1	2	3	4A	4B	5
*Volatile Solids	%	20.1	21.4	9.6	41.2	19.4	7.2
COD	g/l	182	117	166	51	178	10
TKN		1020	1020	1210	290	1290	17
Oil & Grease (Hexane Soluble)		520	640		320	320	60
Lead		71	40	5	1	36	12
Zinc		730	830	320	4910	580	430
Ammonia Nitrogen		64	64	52	25	42	4.4
Cyanide		<0.02	<0.02	0.07	0.04	<0.02	<0.02
Phosphorus		5.6	177	3.2	3.6	1.6	2.6
Iron	g/l	45	53	11	54	49	41
Nickel		0.	200	130	200	150	20
Arsenic		<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Cadmium		42	20	23	<1	10	2
Chromium		175	125	110	255	250	155
*Mercury	µg/Kg	43	22	16	12	18	4
*PCBs	µg/Kg	11	13	8.5	7.6	130	13

*All other values are mg/Kg

Source: City of Chicago, Department of Water & Sewers
Bureau of Water Operations
Water Purification Division
Water Purification Laboratory
Chemistry Unit

from Lake Michigan. The water of the lake is not affected by pollutants in Lake Calumet and the Calumet River. The O'Brien Locks at the junction of the Little Calumet and Calumet Rivers have reversed the flow of water away from Lake Michigan.

6. Ecology

Site vegetation is quite sparse, consisting of only scattered clumps of weeds growing in the uncompacted fill. On a visit in October, 1980 no amphibians, reptiles, or mammals were located. An ecological study of the Lake Calumet area done by the City of Chicago in the Fall of 1978 reported, however, spotting the following species in the surrounding land area:

Common Name	Species Name
eastern garter snake	Thamnophis sirtails
midland brown snake	Storeria dekayi wrightorum
plains garter snake	Thamnophis radix radix
midland painted turtle	Chrysemys picta marginata
leopard frog	Rana pipiens
muskrat	Ondatra zekethica
eastern cotton-tailed rabbit	Sylvilagus floridanus

The Lake Calumet region is also a stop-over point for migratory birds. There is also quite a diversity of

waterfowl and shorebirds in the region. A bird survey done by the City of Chicago is given in Appendix D of this report.

B. Description of the Human Environment

1. Regional/Site History

Prior to the construction of the Cal-Sag Canal and the concurrent flood controls erected in the 1920's and 1930's, the facility site was under water, part of the extent of the old Lake Calumet. The surrounding area, the floodplain, was all marshland. With the construction, Lake Calumet receded and the area drained somewhat. Filling of the area with assorted materials (slag, miscellaneous organics and inorganics, waste materials) began. In 1921 the "Van Vlissingen Plan for Development of the Lake Calumet Area," which recommended significant industrial and port development, was adopted. In 1942, the "Comprehensive Development Plan - The Calumet Industrial District" by the Chicago Plan Commission reaffirmed that the area should be developed for industrial purposes.

Industrial development in the Lake Calumet region has proceeded, although not at the pace originally anticipated. According to the Department of Public Works of the City of Chicago, this is due to:

a. the presence of large tracts of revegetated disposal sites and marshland;

b. areas of fill unsuitable for construction purposes;

c. multiple ownership and unclear titles;

d. lack of adequate roadways and utilities; and

e. the large capital expenditures required to prepare the land for development.

Approximately 2,200 acres of the land around Lake Calumet is owned by the Chicago Regional Port District. The District was formed in 1951 with the purpose of operating the Lake Calumet Harbor. Land not needed for the development of port and harbor facilities is leased. The facility site is leased from the Port District.

Construction at the site began in 1972 by Hyon Waste Management, Inc. An incinerator, an office building, and a control building were constructed at that time. Hyon was the owner and operator of the facility until 1979 when the operating rights and equipment were transferred to Envirotherm. On September 5, 1980, SCA Services, Inc., took over the lease to the land, purchased the equipment, and acquired the operating rights. Prior to

the takeover of the facility by SCA, the incinerator had only operated for approximately 200 days. This low level of use was due to operations, management, capital, and regulatory problems.

2. Land Use Patterns, Zoning and Land Use Plans

Most of the land in the Lake Calumet region is either industrial or undeveloped and zoned for industrial use. The facility site is zoned "Special Use (Incinerator)". Existing land use is shown in Figure IV.3. In the immediate vicinity of the facility site are four steel producers, an auto assembly plant, grain elevators, an electromotive plant, a paint manufacturer, several metal fabricators, brick and lumber yards, boat yards, several landfills, and other assorted industries. There are few business (non-industrial) or commercial concentrations in the area.

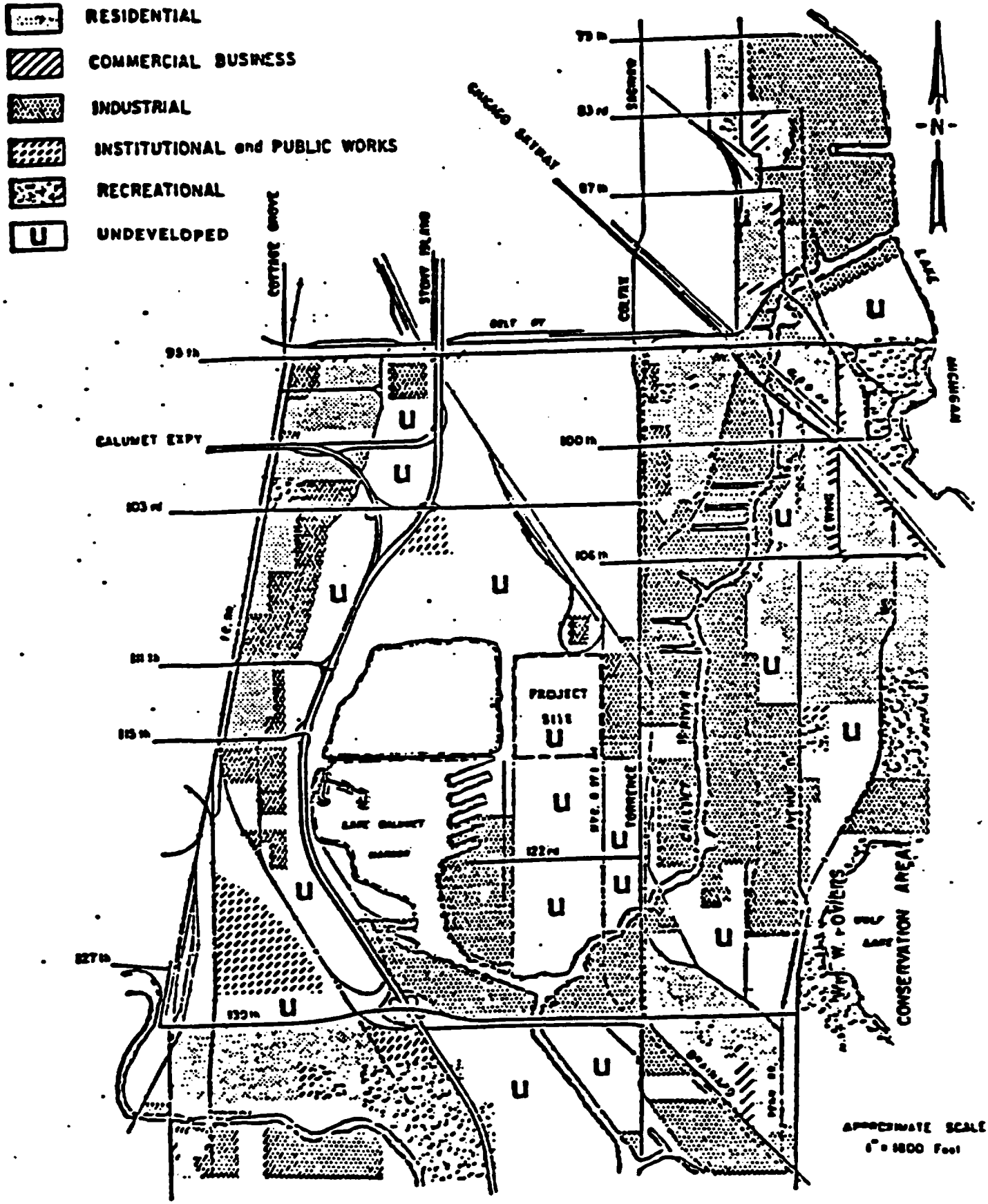
Residential concentrations exist in five areas near the site. These areas, separated from one another by industry and undeveloped lands, are located as follows:

a. Pullman - between the Illinois Central Railroad and the Calumet Expressway, from 95th Street on the north to 115th Street on the south.

b. South Deering - between Torrence Avenue and Van Vlissingen Road, from 95th Street to 130th Street.

FIGURE IV.3.

EXISTING LAND USE



Source: EIS for Lake Calumet Harbor Area Development, City of Chicago, August, 1979.

c. East Side - between the Calumet River and the city limits, north of 118th Street.

d. Riverdale - between the Illinois Central Railroad and the Calumet Expressway, from 115th Street to 138th Street.

e. Hegewisch - between the Illinois/Indiana state line and the Calumet Expressway, from 138th Street to 118th Street.

The communities differ in character. The greater part of Pullman was constructed as a company town in the early 1880's. South Deering is comprised of single-family homes, duplexes, and row houses in a suburban-like setting. The East Side consists of single-family houses and two-flats. Riverdale is a mix of older homes, recent housing, and row houses and garden apartments. Single-family houses and two-flats make up Hegewisch. Between 60% and 70% of the residential population in the area is Caucasian. The closest residential area to the site is approximately one mile and is separated from the site by Lake Calumet.

Assorted parks exist in the general area, for example, Calumet Park, Eggers Woods, Wolf Lake State Park, Burnham Woods, and Beaubien Woods. There are also scattered,

smaller parks in the residential areas. None, however, are adjacent to the facility site.

Land use plans for the Lake Calumet area are for continued and expanded industrial development. The recognized land use plan for the City of Chicago, The Comprehensive Plan of Chicago (1966), designated the Lake Calumet area as a private initiative opportunity area. This infers that the area will require funding by the City for street, utility, and protection services improvement. Generally, the plan calls for:

a. The improvement of the environment, services, and accessibility of existing individual areas;

b. The development of additional areas for manufacturing; and

c. The provision of needed services for industrial developers.

An update to The Comprehensive Plan, the Far Southeast Development Area Report (December 1968), recommended improvements to the Lake Calumet area with respect to residences, industry, transportation, community facilities, and social programs. These improvements would be for the purpose of encouraging industrial development and creating job opportunities.

The Northeastern Illinois Planning Commission has also published a Comprehensive General Plan for the development of the northeastern Illinois counties area. This plan calls for the expansion of industry in the area to improve economic growth.

3. Demography

The facility site lies within the limits of the City of Chicago. An April 1, 1975 census estimate listed the population of the City of Chicago as 3,099,341, an 8.21% decrease since 1970. The population consists of 65.6% whites, 32.7% blacks, 7.3% Spanish-Americans, and 1.7% others. Like other urban areas today, Chicago is experiencing an increase in minority populations but an overall decrease in population.

4. Areawide Economy

Manufacturing concerns employ the largest number of persons in the Chicago area. Service industries, retail establishments, and government are the next largest employers. (In the Chicago Standard Metropolitan Statistical Area, SMSA, 75% of wages are paid by these four activities.) Median family income in the SMSA is higher than the national average. Unemployment rates in the City of Chicago, however, are also slightly higher. This has been due in part to the relocation of manufacturers

to the suburbs. Over 50 plants, for example, have relocated in the past three years.

The Lake Calumet area, specifically, is a center for numerous industries. Almost half of the land in Chicago zoned for manufacturing lies in the Lake Calumet area. The area has the reputation of being where new industry should locate since so much vacant land is available. As noted, the area immediately adjacent to the site is highly industrialized.

5. Transportation System

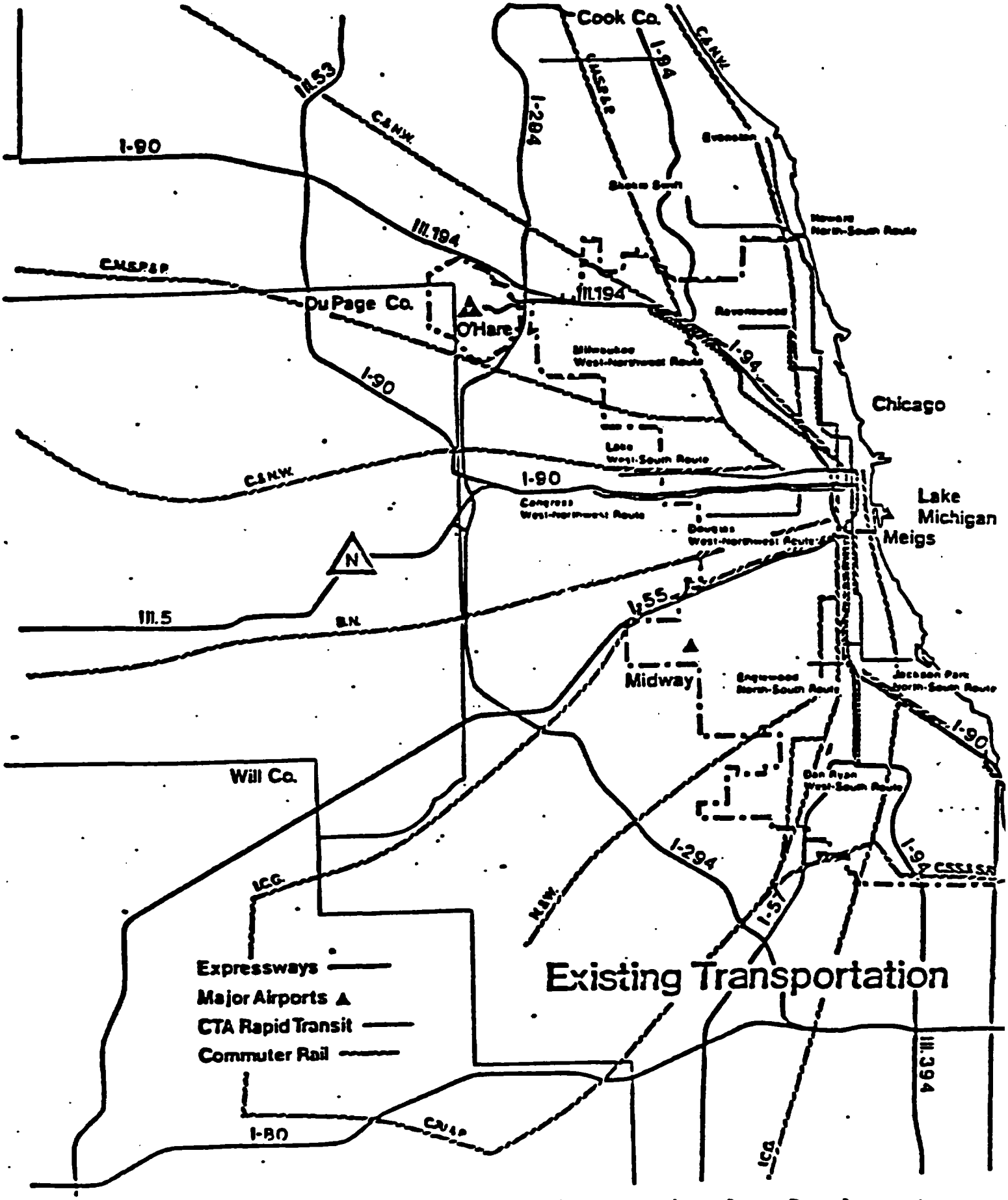
The Chicago and Lake Calumet areas are well served by transportation lines. Existing major transportation systems for the Chicago area are shown in Figure IV.4. Systems specifically around the Lake Calumet area are shown in Figure IV.5.

Major expressways radiate out from the center of Chicago allowing movement into and out of the city from suburban areas. Those expressways which connect the Lake Calumet areas with the central city are Interstates 90 and 94 (the Calumet Expressway).

The rail system also follows a radial pattern into the suburbs. Branches of all the major raillines run into the Lake Calumet area. Bus service, however, is the major means of mass transit in the Chicago area.

FIGURE IV.4.

EXISTING TRANSPORTATION (CHICAGO AREA)



Source: EIS for Lake Calumet Harbor Area Development,

Three major air terminals are in the City of Chicago: O'Hare International Airport (which handles the bulk of passenger traffic), Midway Airport, and Meigs Airport. Military airports and smaller, suburban terminals also exist.

Water transportation is also very important in the region, due to the presence of Lake Michigan. Numerous harbors exist along the shoreline. Calumet Harbor, on the shore of Lake Michigan, is at the mouth of the Calumet River, which leads into Lake Calumet and the Little Calumet River.

6. Areawide Service Facilities

The Calumet Fire Department, the Calumet Police Department, and the South Chicago Community Hospital are all located relatively close to the facility. The fire and police departments are accessed by dialing 911; the hospital is accessed by dialing 312/978-2000.

Within the general area, educational facilities include nine elementary schools and four high schools. As previously mentioned, there are assorted parks in the area, for example, Calumet Park, Eggers Woods, Wolf Lake State Park, Burnham Woods, and Beaubien Woods; smaller parks are scattered in the residential areas.

7. Historical and Archaeological Features of the Study Area

No historical or archaeological features are known to exist on the facility site.

8. Areawide Aesthetics

The facility is located in an area containing heavy industrial and landfilling operations. There is no public access to Lake Calumet in the vicinity of the site and no recreational facilities. The area is not along a major access road or near a residential area. The area is not visible from the most heavily travelled roadway, Torrence Avenue. Decaying and abandoned equipment, open landfilled areas, and incinerator stacks are visible throughout the surrounding area. The site itself is currently unappealing from an aesthetic perspective.

9. Noise Generation

Due to the large amount of industrial activity in the area, there are numerous significant generators of noise. Interlake Steel, Republic Steel, Wisconsin Steel, General Motors, Ford Motor Company, and Cargill, Inc. are some in the immediate area. Traffic related to these and other industrial and landfilling activities and the operation of the adjacent rail system also contribute to the noise.

On September 26, 1978, the City of Chicago completed the following noise measurements in the vicinity of the facility site:

		Measurement		
	Distance	L10	L50	L90
Noon - 1 p.m.				
Stony Island & 116th St.	50'	66	56	50
Stony Island & 118th St.	50'	63	57	53
4 - 5 p.m.				
Stony Island & 116th St.	50'	66	56	50
Stony Island & 118th St.	100'	54	50	50

10. Odor Generation

A variety of odors is currently produced in the vicinity of the facility site. Landfills produce the smell of degrading garbage. There are also odors from coke ovens, steel plants, waste incinerators, and various other industrial activities.

11. Health and Safety

The operation of a well maintained and well designed hazardous waste management facility will not pose a threat to human health or safety. The proposed modifications represent state-of-the-art technology for the treatment, storage, and disposal of hazardous wastes.

The entire facility has been designed and will be operated in such a manner as to minimize the possibility of an unplanned discharge to the air, soil, or surface waters. Major safety features for the proposed facility include containment dikes to separate incompatible wastes, lined surface impoundments, treatment for gaseous discharges to the atmosphere, grounded waste unloading areas, nitrogen blanketing of all tanks containing flammable wastes, complete instrumentation and monitoring for the incinerator and Ronex process areas, a comprehensive inspection plan, contingency plan, and training program, spill containment systems and clean up equipment, and monitoring of all discharges.

A waste characterization and analysis plan has been developed for the facility to ensure proper handling and proper treatment of all incoming wastes.